ISLAND INNOVATION IN AN ERA OF CLIMATE CHANGE: TOKELAU'S MORAL LEADERSHIP THROUGH RENEWABLE ENERGY

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Honors Thesis
Department of Geography
University of North Carolina at Chapel Hill
2016

Approved:

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Abstract

Keywords: Tokelau; climate change; renewable energy; island innovation; SIDS; solar energy

Small Island Developing States (SIDS) have become protagonists in the global movement to reduce greenhouse gas emissions by calling upon their extreme environmental vulnerability to situate themselves as leaders in the fight against climate change. At international climate conventions, SIDS have captured the imagination of the public worldwide by demonstrating the real impacts of climate change in an accelerated timeframe. The prevailing wisdom dictates that SIDS are non-competitive in entrepreneurship, yet these small nations have become global leaders in both mitigating their contributions to greenhouse gas emissions and adapting to the effects of climate change. By engaging in policy innovation, many islands have been able to turn their constraints to their advantage to situate themselves as global leaders in knowledge production for climate change adaptation. Yet, how might innovation be characterized in the context of climate change? This study approaches this question using the case of the Pacific island territory of Tokelau, which has a population of less than 1,500, and yet became a global leader in climate debates by generating almost all of its electricity with solar photovoltaic panels. As an extremely isolated and recently depopulated territory, Tokelau had major constraints to developing such a project. This study identifies creative indigenous thinking and engagement with its political status as a sub-national island jurisdiction (SNIJ) of New Zealand as island innovations that enabled Tokelau at once to enact the groundbreaking Tokelau Renewable Energy Project and couple it with a move towards moral leadership in global climate politics. These finding reveals that SNIJs and SIDS can turn their perceived disadvantages as small and isolate states into engines of innovation that create a significant impact within and well beyond their own shores.

Acknowledgements

I would like to express my sincere gratitude to my advisor at the University of North Carolina at Chapel Hill, Dr. Elizabeth Havice, for her expertise, patience and understanding throughout the planning and realization of this project and for her constructive responses to my sometimes naïve opinions. I would also like to thank my second reader, Dr. Aaron Moody, for his help in the initial conceptualization and continued interest in and support for the project. I extend a very special thanks to the late Aliki Faipule Foua Toloa, who inspired my interest in the Pacific and introduced me to the wonderful islands of Tokelau. I will be ever grateful for his assistance and regret that he could not see the results of this research. Furthermore, I would like to thank Paula Faiva for her support in learning about Tokelau and facilitating meetings with government officials.

This research would not have been possible without the financial support of the Morehead-Cain Foundation and the wonderful staff who helped in the planning process. I would also like to thank various faculty at the University of Auckland that helped with the formative stages of the research including Dr. Paul Kench, Dr. Susan Owen, Dr. Judith Huntsman and Dr. Damon Salesa. Additionally, thanks to the staff at SPREP in Apia for allowing me to participate in their events and use their archives, to Thomas Jensen of UNDP Suva for his help on finding documents relating to TREP and to Coral Pasisi in Niue for her introduction to the island and answers on the Green Climate Fund. Finally, I would like to thank all the other people of New Zealand, Tokelau, Fiji, Niue, Tuvalu and Samoa who welcomed me into their homes and answered my peculiar questions. There are too many people to mention, but in particular Latoya Masina for her friendship and for introducing me to the culture of the Pasifika people of South Auckland.

Contents

List of Abbreviations

AIMS	Africa, Indian Ocean, Mediterranean, South China Sea
AOSIS	Alliance of Small Island States
CARICOM	Caribbean Community
CANCC	Coalition of low lying Atolls on Climate Change
COFA	Compact of Freedom Association
COP	Conference of Parties
EEZ	Exclusive Economic Zone
FFA	Forum Fisheries Association
GDP	Gross Domestic Product
GoT	Government of Tokelau
IOC	Indian Ocean Commission
LDC	Least Developed Country
LMS	London Missionary Society
MIRAB	Migration-Remittances, Aid-Bureaucracy
MFaT	Ministry of Foreign Affairs and Trade
NGO	Non-Governmental Organization
NZ	New Zealand
PICT	Pacific Island Country
PIF	Pacific Islands Forum
SIDS	Small Island Developing State
SNIJ	Sub-National Island Jurisdiction

SPREP	Secretariat of the Pacific Regional Environmental Program
TeleTok	Telecommunication Tokelau Corporation
UN	United Nations
UNDP	United Nations Development Program
UNGEF	United Nations Global Environmental Facility
UNCCC	United Nations Climate Change Conference
UNCTAD	United Nations Conference on Trade and Development
UNFCCC	United Nations Framework Convention on Climate Change
UNOHRLLS	The United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States
WTO	World Trade Organization

Tokelauan Terms

aliki	chief, lord
faipule	position, one elected responsible for representing each atoll
fakaTokelau	the Tokelau way
fono	meeting, council
inati	system of collective sharing within villages
kaiga	Extended family
motu	islet with vegetation
Taupulega	Village Council, Council of Elders
Ulu o Tokelau	Head of the National Government of Tokelau
vaka	boat, ship, canoe

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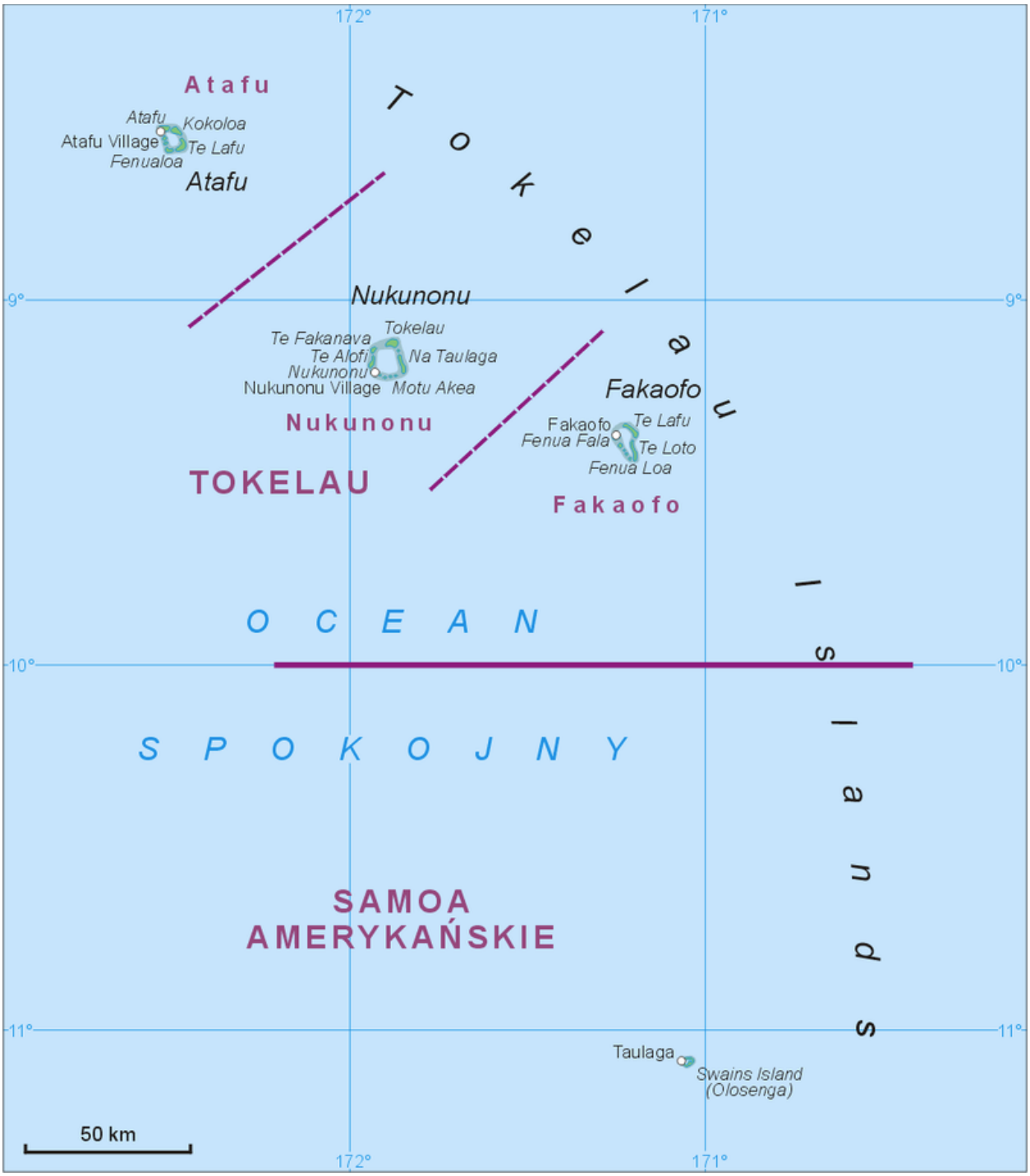
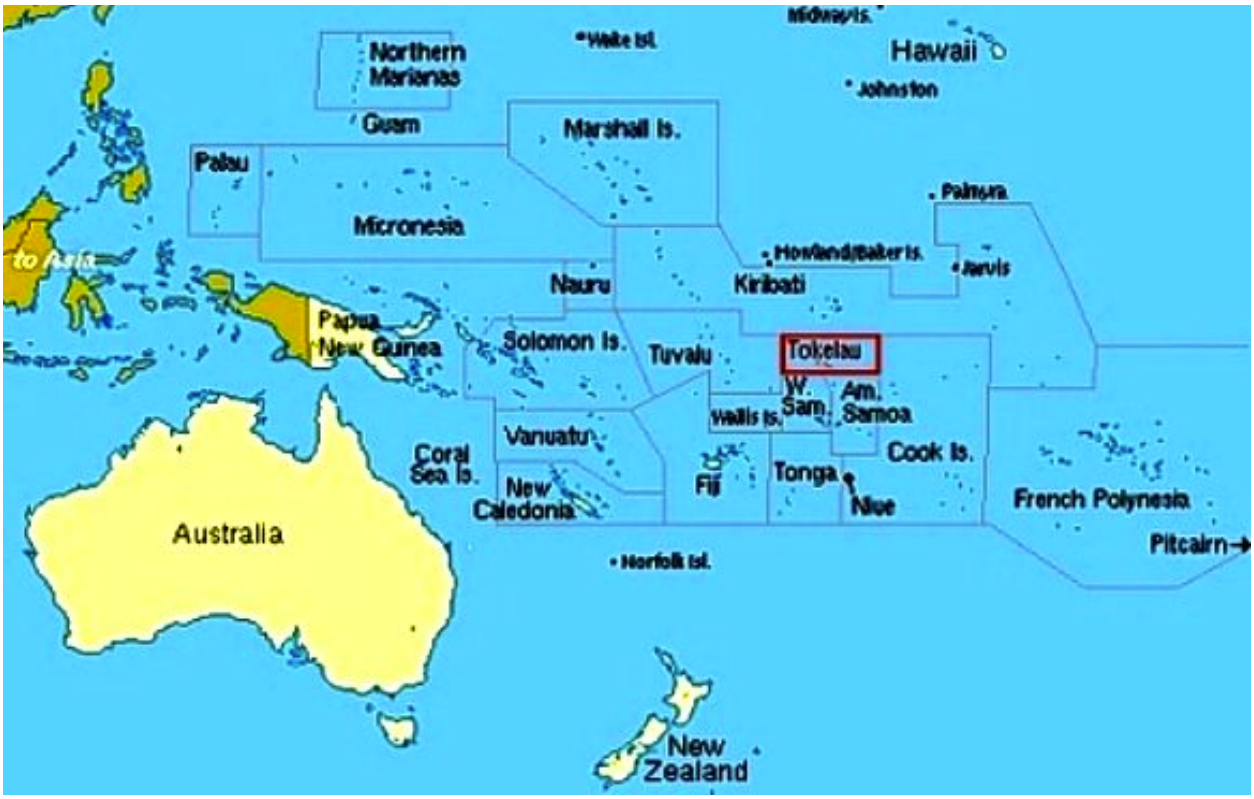


Figure 1.1: Map of the Tokelau Islands including Swains Island (Olohega), a jurisdiction of American Samoa (Bluebird Marine Systems, 2015).



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Chapter 1: Islands in a changing climate

"On an island, you are disconnected, with water all around you. On an island, you are alone, even if you share the place with others. The location is by definition eccentric, because it acknowledges a centre elsewhere"

- Islands: A Trip Through Time and Space (Conrad, 2009)

Climate change is one of the most complex political-ecological processes in history. It unites and divides peoples across continents, and is experienced in varying degrees, often according to global power dynamics. From Beijing to Suva and Paris to Funafuti, grassroots political movements on climate change have brought people together to find solutions to an intricate socio-environmental crisis. This global movement has shown that environmental issues can connect even the most isolated of regions to global political discourse.

In this thesis, I turn attention to the ways that Small Island Developing States (SIDS) have become heroes of the climate movement at United Nations (UN) conferences through the innovative management and planning of public relations, bringing attention to the impacts of climate change. The Maldives gained global press coverage when the President and his entire cabinet scuba-dived to hold a meeting underwater to demonstrate the risk posed to the country by sea-level rise (Ramesh, 2009). Additionally, the President of Kiribati was lauded for announcing the purchase of land in Fiji to relocate his entire population to in the event of national inundation (Caramel, 2014). Through acts like these, SIDS have captured the popular imagination about climate change, drawing attention to their own plight as highly threatened but fighting for their survival and to the global processes outside of their jurisdictions that have created their problems.

The distinctive physical constraints of islands make them particularly vulnerable to climate change. Their small size, remoteness and economic vulnerability means the impacts are often accelerated and magnified and so felt much more acutely than in mainland areas (Connell, 2013). Atolls in particular are vulnerable due to their low-lying nature and dense populations. These islands are created as extinct volcanic craters subside beneath the water, permitting a coral platform to grow upwards and form reefs. This leaves thin strips of land broken up into islets called motus, which surround large internal lagoons. Kiribati, the Marshall Islands, the Maldives, Tuvalu and Tokelau are atoll nations and territories that are threatened with the potential climate change impact of sea level rise that stands to submerge entire countries (Farbotko, 2015). Nevertheless, all islands tend to have coastal populations, and even those that are not at risk of disappearing entirely face severe challenges from their littoral orientation.

Opportunities have also arisen from climate change discourse, as SIDS have sought to capitalize on the new attention they have gained through their plight. Displays of innovative practices have turned the spotlight to these peripheral areas, and many islands have demonstrated that they are eager to excel in developing solutions that have global applicability (Barnett & Campbell, 2010). By leading in both greenhouse gas mitigation and climate change adaptation, islands can participate economically in a system that marginalizes their existence. To do so, they can not only lead sustainable development but create a moral high ground from which to call for reductions in greenhouse gas emissions from polluting countries. Many of the geographic conditions unique to islands have allowed SIDS to create this niche and global environmental politics, and find innovative ways of creating new income streams to allow them to compete in the global political-economic system despite their perceived disadvantages.

1.1 Insularity and heterogeneous island features

Islands have historically been conceptualized in political and economic geography as marginal entities on the fringes of power. In common discourse, the word "insular" is used to describe inward-looking, backwards and isolated areas. Traditionally, islands are not viewed as engines of innovation in the same way a large city might be (Briguglio, 1995). However, the unique characteristics of islands and islanders have given them special capabilities to establish new ways of doing things that in some cases enable them to become leaders in their fields, for example in the way many islands have positioned themselves and their public policy in the climate change debate.

SIDS are a sub-group of islands that generally have similar characteristics such as low per capita GDP, remoteness and vulnerability to environmental shocks. They are found in three main groups in the Caribbean Sea, Western Indian Ocean and Southern Pacific Ocean. Despite these common economic and geographic features, there is much variation between and within these groupings and the barriers they face to development. There is no single definition of SIDS, and the inclusivity of the term can vary hugely. The United Nations Conference on Trade and Development website (UNCTAD, 2013) states that "the UN never established criteria to determine an official list of SIDS", but maintains a website of 29 SIDS on its website for analytic purposes. This is probably one of the more exclusive definitions as it is limited to UN members with very specific characteristics.[1]

The Alliance of Small Island States (AOSIS) (2015) has a broader definition and includes 39 members. Niue and the Cook Islands are not UN members but are classed as independent sovereign nations by AOSIS. Larger nations like Cuba, the Dominican Republic and Haiti are also members of AOSIS, but often excluded in other fora. It also includes several non-island countries with geographical, cultural

[1] See Appendix A for a full list of SIDS with notes on different definitions

or historical similarities to island nations which embraces Belize, Guyana, Suriname and Guinea-Bissau. The island nation of Singapore is also an AOSIS member, despite its massive growth in recent years to be one of the top five countries in the world by GDP per capita. AOSIS also has several observer nations that are sub-national island jurisdictions (SNIJs), incorporating American Samoa, Guam, U.S. Virgin Islands, Puerto Rico and the former Netherlands Antilles. The United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States (UNOHRLLS, 2016) definition additionally counts some British and French SNIJs such as the Cayman Islands, Bermuda and French Polynesia.

Other definitions might include the combined members of the Pacific Islands Forum (PIF),[2] the Caribbean Community (CARICOM)[3] and the Indian Ocean Commission (IOC).[4] However, this definition would also include some larger countries with dissimilar socio-economic characteristics such as Australia, New Zealand and Madagascar, and still fail to include many integral and undisputed SIDS such as the Maldives, Cape Verde and São Tomé and Príncipe. It would also neglect to include many SNIJs with SIDS characteristics. The relationship between the terms of islands, SNIJs and SIDS is represented in Figure 1.5.

SNIJs are sometimes neglected from the definition of SIDS, as the category of islands is often used in a UN context which has little consideration of their role. Inclusivity of SNIJs could potentially add large numbers to the total number of SIDS due to the many small jurisdictions that remain as entities

[2] PIF members are Australia, Cook Islands, Fiji, Kiribati, Marshall Islands, Micronesia, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu; associate members are New Caledonia and French Polynesia; observers are Guam, Timor-Leste, Tokelau, American Samoa and Wallis and Futuna.
[3] CARICOM members are Antigua & Barbuda, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname and Trinidad and Tobago; associate members are Anguilla, Bermuda, British Virgin Islands, Cayman Islands and Turks and Caicos Islands; observers are American Samoa, Guam, Timor-Leste, Tokelau, and Wallis and Futuna.
[4] IOC members are Comoros, France (Réunion), Madagascar, Mauritius and Seychelles.

within other nations. The problem becomes defining sovereignty and autonomy, as there are many jurisdictional categories of governance. Some islands, such as Palau, the Marshall Islands and the Federated States of Micronesia are independent members of the UN but remain in free association with the United States under a Compact of Free Association (COFA), from which they receive extensive aid, military protection, and rights to migration and work. In issues such as the Israel-Palestine conflict, these COFA countries are SIDS that have notably been the only other countries to vote alongside the US and Israel, while the rest of the world votes against or abstains (Cerone, 2012). Tokelau could be defined as a SIDS through its status as an observer of PIF, but is often not counted as one because of its constitutional relationship as a dependent territory of New Zealand. However, Niue and the Cook Islands are usually counted due to their greater autonomy, and Tokelau's socio-economic characteristics are very similar to those of other SIDS nations.

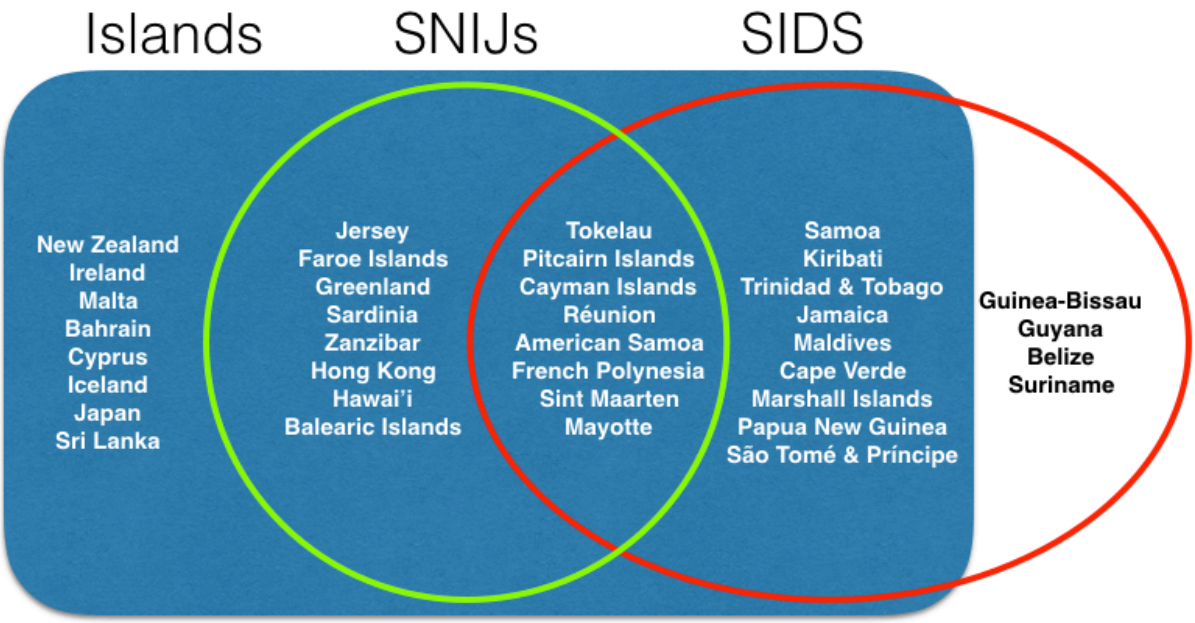

Figure 1.5: Examples of polities falling under the SNIJ and SIDS categories and the possible relationships between them.

The Government of Tokelau is also conscious of being part of the SIDS community while lacking the full ability to take part at the UN level. At climate summits, Tokelau has strongly self-identified with the SIDS group and participated alongside them (Nasau, 2014). Tokelau is an independent member of organizations such as the Pacific Islands Forum (PIF), Coalition of low lying Atoll Nations on Climate Change (CANCC), Secretariat of the Pacific Regional Environmental Program (SPREP) and Pacific Islands Forum Fisheries Agency (FFA), which are entirely or majority made up of other SIDS countries. At the 2014 Third International Conference on SIDS in Samoa, the Government of New Zealand allowed the head of government, the Ulu o Tokelau, to speak in the single time slot allocated to each UN member, affirming the place of Tokelau as a SIDS, but also affirming New Zealand's position of power over Tokelau's political positionality (Nasau, 2014).

In the Pacific region, the political structure of the islands varies markedly, with most of the population living in the twelve fully independent states and the remainder living in the eleven territories or associated states with varying degrees of local autonomy. These Pacific SNIJs continue to be administered in part by Australia (Norfolk Island), New Zealand (Tokelau, Niue and the Cook Islands), France (New Caledonia, Wallis and Futuna and French Polynesia), the United States (Guam, American Samoa and the Northern Mariana Islands) and the United Kingdom (the Pitcairn Islands). Across the Pacific, SIDS populations range from Niue and Tokelau, each with under 1,500 people, to Papua New Guinea with over 7 million. Pacific SIDS are notable in the enduring prominence of traditional forms of governance, such as communal land ownership and chiefly titles (Dornan, 2015). Within the region there is much cultural diversity between the Polynesian, Melanesian and Micronesian regions and the varied groups within them.

Many Pacific countries and territories are fragmented and isolated with large populations spread over dozens of islands. Kiribati has 100,000 people on 21 atolls spread over 3.5 million square kilometers of land. Others SIDS are more condensed onto one or two main islands making transportation easier between them. Niue's small population all live on a single island, whereas Samoa is mostly spread over two main islands frequently connected by a short ferry crossing. Fiji is a major transportation hub with daily direct transport links to Australia, New Zealand, the United States, Korea and many other Pacific islands. Others such as Tuvalu and Kiribati are only accessible via a single weekly flight from Fiji. Tokelau and Pitcairn lack airports and are only accessible by occasional boats that may have a journey time of several days. Their small size means that in smaller SIDS regardless of sovereignty status, costs for administration remain disproportionately high and give rise to bloated public sectors, further seen as a disadvantage to development (Connell, 2013).

Discussion about the development of SIDS usually concern their economic viability in the global economy, concluding that islands are inherently economically uncompetitive, precluding them from achieving sustainable development (Connell, 2013). Private sectors in these areas are seen as fundamentally disadvantaged in the global economic system, as they lack the economies of scale to host viable businesses (Winters & Martins, 2004). This narrative relies upon the portrayal of isolation and lack of agency, with islands consistently posed as the vulnerable group manipulated by outsiders for their own benefit.

1.2 Island innovation

Bucking this conventional wisdom, scholars have recently turned attention to the fact that islands are also commonly places of innovation. Having some inherent economic disadvantages, they also have important advantages that foster creativity and ingenuity. The limited resources on many islands

creates resourceful communities and new ways of thinking that can set examples for the outside world to follow (Baldachino, 2015). This is innovation in its broadest sense, from the development of niche cottage industries to unique forms of political governance.

Island nations encourage small businesses to thrive and often have fewer people employed by multinational companies. This is a trend observed even in larger island nations such as New Zealand. Despite its very open liberal economy, New Zealand is still a nation of entrepreneurs (Hamilton & Dana, 2003). The small size of the market discourages multinational entry and means islanders must be more resourceful, retaining the small nature of their businesses. In the Chatham Islands, an archipelago to the East of New Zealand, Dana (2003) found that a single business initiative to set up a local airline proved crucial for the other businesses on the islands, illustrating the vulnerability that small enterprises on islands may have and the steps they must go to to overcome them.

One form of small-scale entrepreneurship featured in this literature relies on unique traditional methods to cope with island conditions. A lack of outside expertise means islanders must find their own methods to be resourceful and adapt to the local environment. For example, in Fair Isle, Scotland, a unique form of knitting became a mainstay of the economy, to the point where the handicraft was named after the island (Butler, 2015). Local women advanced the economy and retained a unique aspect of their culture, showing many of the most successful entrepreneurial activities can also be the traditional ones and that the originality of island crafts is a key marketing point that can give competitive advantage. These internally orientated innovations make use of island characteristics such as unique resources and isolation to create a brand, which can be reinforced by their status as a SNIJ.

Another form of entrepreneurship relies on the uniqueness of island jurisdictions. SNIJ status potentially offers a way to let islanders retain self-governance, while relying on the support of other larger and more economically integrated nations. In many cases, this means the islands and the islanders occupy a unique political situation that can be exploited for their benefit; but that can also make them vulnerable to changing political conditions in their mother country. For example, Jersey is a SNIJ in the form of a Crown Dependency of the United Kingdom, but exists outside of both the United Kingdom and the European Union. Jersey's economic success has relied on taking advantage of this unique position and making creative legal changes to attract companies and investment (Entwistle & Oliver, 2015). The small size of such jurisdictions means they have the agility to move quickly before larger countries and carve out a niche to provide services that would not be possible in a large country or as an integral polity of a larger country. The nature of many island economies to rely on monocultures means they must be nimble to adapt and change to the market. Jersey produces a range of services that are interconnected but not interdependent and so can adapt with changing financial markets. In the case of American Samoa, designation as a territory has helped to sustain two large tuna canneries, the largest private sector employers in the country, for several decades. The territorial designation grants the tuna canneries duty free access to the US market as well as access to lower cost labor than is available on the US mainland, important competitive advantages that sustained the canneries – the largest source of private sector employment in American Samoa – for many decades (Campling & Havice, 2007).

Islanders may also develop different attitudes towards risk to mainlanders. In the Maldives, islandness helps shape the business and entrepreneurial cultural. Maldivians traditionally base business deals on community trust and tradition, and it is rarely seen as necessary to formalize partnerships in business deals as the small size of the community means trust is paramount (Dana, 2002). This allows islanders

to bypass the need for investment capital, and the lack of this and infrastructure is not seen as a constraint. In this way, islanders can use their trust as a form of capital to engage in business. Faith and the Islamic economic system also influence business practices, creating a differing situation to other islands that is specific to the Maldivian context. The evidence suggests that the small size has an impact on the community and in turn this affects entrepreneurship.

The innovation occurring on islands counters the conventional wisdom that they are unproductive backwaters with little opportunity for business or potential to shape political processes. The geographical situation of islandness itself can promote opportunity and be a driver of entrepreneurship and ingenuity. Many islanders have long lived without the wide availability of goods and services available to those on mainland areas, and this has created a culture of resourcefulness. In the face of large scale environmental issues, this resourcefulness has been repurposed to maximize the benefit for islanders to find a place in the global economic system. While a global climate crisis threatens the very existence of many SIDS, it has also provided an opportunity to engage with the global economic-political system.

1.3 Climate change rhetoric

Island nations, and SIDS in particular, are at the forefront of political action to reduce global greenhouse gas emissions and this thesis investigates how island isolation and innovation intersect with the dynamics of global climate politics. Sea level rise severely threatens the existence of several atoll nations and many areas are now becoming more prone to impacts such as increased flood risk, salt-water intrusion and storm surges. There are also long term risks such as reduced food security and the arrival of new diseases. Perversely, SIDS are the smallest contributors to global greenhouse gas emissions despite bearing the brunt of the impacts.

There is a great pessimism for the future of low-lying atolls, that are often framed as doomed to disappearing in the mainstream media and whose residents are seen as inevitable refugees (Farbotko, 2005). Farbotko (2010) argues that atolls are constructed through the lens of 'wishful sinking'. This implies that they represent the 'canary in the coal mine', and only become valuable in the eyes of the rest of the world on their disappearance due to rising sea levels. In this discourse, the islanders are portrayed – or portray themselves - as on the verge of evacuation as the land disappears beneath their feet, and no thought is given to the effect of this discourse on their contemporary culture and livelihoods. Farbotko argues that atolls represent laboratories that experience accelerated processes of climate change in real time for the world to see and show the real implications of greenhouse gas emissions, but this is used at the expense of islanders, who are portrayed as passive victims.

This pessimistic discourse of mainstream media neglects the positive impact islanders themselves are having on the global stage by raising awareness of the very real threats they face and developing on the ground projects to curb greenhouse gas emissions. The SIDS group of countries played a pivotal role at COP15 in Copenhagen and COP21 in Paris, helping secure an agreement to curb global greenhouse gas emissions (Barritt, 2015). Activists from across the Pacific Islands have also made their voice heard through peaceful protest at coal exports in Australia (Clark, 2014). This evidence suggests that rather than being passive and marginalized victims of environmental change and stunted global politics that enable it to continue, Pacific islanders and their governments achieve and innovate agency largely through the climate change debate, enabling them to reach a global audience.

On many islands, climate change has provided a new platform and urgency for innovation. SIDS want to prove to the world it is possible to live sustainably, and have been driven to develop new political

and practical ways to express this (de Águeda Corneloup & Mol, 2014). Climate change adaptation and mitigation have become a platform for SIDS to express their views and provide an alternative path. Island governments want to become leaders and take advantage of their unique conditions as laboratories of innovation (Greenhough, 2006). Increasing penetration of renewable energy is one way that islands show leadership on climate issues.

1.4 Renewable energy as a tool for multi-scalar climate action

Islands are fortunate to have significant renewable resources at their disposal, in particular solar energy in many SIDS. There are strong island-specific motivations driving this innovation in renewables, which again run contra to the noncompetitive expectations held for SIDS. The cost of fuel imports is some of the highest in the world, due to isolation and diseconomies of scale combined with inefficient generation methods (Dornan, 2012). There is a strong political incentive to become global leaders for environmental reasons, as islands have formed a niche position in climate change negotiations.

Large volumes of money have been made available through the United Nations Global Environmental Facility (UNGEF) in order to help Pacific Island countries meet their requirements under the United Nations Framework Convention on Climate Change (UNFCCC) (Barnett & Campbell, 2010). National energy roadmaps are a tool created by non-governmental organizations (NGOs) to help island governments meet targets for generation of renewable energy. Dornan (2012) commented that PICs have some of the highest targets for renewable energy penetration in the world and questioned whether these goals were achievable or made as a political statement to achieve global press.

Projects take a wide variety of forms, but in many SIDS the medium-term goal is 100% of electricity generation by renewable sources. There is a strong emphasis on solar energy in the Pacific region, but

test projects are being carried out for wind and wave energy. Funders consist of UNDP and bilateral donations from a wide variety of countries. In Tuvalu, New Zealand funded an ambitious project to provide solar generation for all outer islands, and is currently working on solar for the main atoll of Funafuti (NZMFAT, 2015). The small size of Tuvalu has meant the project was mostly funded by a single foreign donor, but in larger countries there are various ongoing projects and coordination can be complicated.

This thesis focuses on Tokelau, which is acknowledged as the first country in the Pacific to take significant steps in its renewable generation ability. In 2012 Tokelau completed a 1MW solar installation that provided for over 95% of the nation's electricity generation needs, and was widely acclaimed for this display of environmental leadership. Tokelau is another atoll nation at serious risk of climate change, and so has a strong incentive to lead by example and display the potential of renewable energy generation. Through creative policy and technological innovation, Tokelau has engaged the world to draw attention to the problems faced by SIDS. Tokelau has used this leadership to encourage other countries to reduce greenhouse gas emissions and adopt renewable energy as a mainstream source of power. As a pioneer in the region, Tokelau's proof that solar works for Pacific SIDS encouraged the installation of solar plants on its island neighbors in a region with previously limited experience of renewables. The impact was also felt locally with large savings to the government budget with the reduced reliance on expensive fossil fuel imports, showing the interplay of local and global pressures that incentivized the construction of the project.

1.5 Objectives and methodology

The objective of this thesis is to use the case of Tokelau's renewable project to explore the way that islands, and particularly the subcategories of SNIJs and SIDS, have expressed and developed agency

collectively by engaging with multiple dimensions of climate change and efforts to address it – a climate change motivated form of innovation. It contributes to understanding the role of renewable energy in PICTs and the impact this development has had and is having in a global context.

As an isolated and depopulated territory, Tokelau would not be expected to be a leader in knowledge production and technological innovation for addressing the pressing global problem of climate change or the local conditions in an atoll nation that it is producing. The prevailing wisdom is that SIDS are non-competitive in entrepreneurship, yet this tiny nation became a global leader in climate change mitigation and adaptation by generating almost all of its electricity with solar photovoltaic panels through the Tokelau Renewable Energy Project (TREP). How was Tokelau able to enact such progressive energy policy local and global effects? What explains this innovation?

This thesis aims to explain how SNIJs and SIDS are essential categories linking global environmental politics to entrepreneurship and innovation. By looking at the relationships of small islands to the wider discourse, it aims to understand how islands have exerted agency to become key players in the climate change debate. In order to examine this relationship, this paper uses the case study of TREP and the following methods:

- comprehensive literature review in the fields of island innovation and global environmental politics;
- analysis of historical relationship of SIDS with their colonial powers and the United Nations system;
- documentation of how Tokelau emerged at the forefront of renewable energy action in the Pacific region and the agency this developed;

- documentation of the local, national and international socio-economic processes that influenced the development of TREP;
- analysis of the impact that renewable projects such as TREP can have on discourse domestically and internationally;
- identification of the advantages and disadvantages that insularity poses to developing renewable energy projects such as TREP.

In order to investigate these questions, the research examines perspectives of the various TREP stakeholders including the Government of Tokelau, New Zealand Ministry of Foreign Affairs and Trade, contracted companies and the United Nations Development Program. A semester in 2015 spent in the Geography and Pacific Studies Departments of the University of Auckland was valuable for shaping research questions, background data on renewables projects in the Pacific and working with and interviewing scholars that are experts on the Pacific. Attending conferences, including the Caribbean Renewable Energy Forum in Miami was useful for comparing progress of renewables in SIDS in other parts of the world.

The bulk of the research in the Pacific Islands took place between May and August of 2015, with time spent in Niue, Tuvalu, Fiji and Samoa. Due to the two-day boat ride and infrequent service to Tokelau, it was impossible to visit the islands, but meetings with various representatives of the Government of Tokelau based in Apia and Samoa provided the information needed to make up for this. Prior to his death in 2015, Aliki Faipule Foua Toloa, former Ulu and one of the key initiators of TREP, provided a great deal of knowledge for his motivations for the project and the role of Tokelau in global climate negotiations. Paula Faiva, Tokelau's Climate Change Manager, also provided her inputs in Tokelau's development of renewable energy and its effect on relationships with international organizations.

Access to the archives of the Secretariat of the Pacific Regional Environmental Program (SPREP) in Apia also proved to be a valuable resource of documents on renewable energy programs in the region. As renewable energy is a relatively new and under-resourced part of SPREP's work, there was a lack of specific information in this area. However, there were many documents relating to the history and regional planning of Tokelau that were useful for contextual analysis of the project, such as administrator reports, national strategic plans and climate change impact assessments. A visit to Thomas Jensen at the UNDP offices provided many technical and background documents on TREP itself, including copies of the many site assessments and reports on the prospect of Tokelauan renewable energy in the decade leading up to the installation.

Chapter 2: Literature review

"We are not major contributors to global greenhouse gas emissions… but we believe that if we are to show moral leadership then we have to lead by example."

-Dr. James Fletcher, Minister of Energy for St Lucia at

Paris United Nations Climate Conference (GreenTV, 2015)

Islands are not commonly seen as places of innovation. Discourses in the fields of political economy and economic development in particular situate them as occupying colonial backwaters, with citizens that lack the power to govern themselves effectively and drive their own development. Yet small island developing states (SIDS) are leading the way in renewables and have set some of the most ambitious targets for renewable energy penetration worldwide (Dornan, 2015). These actions are driven by the increasing costs of traditional fossil-fuels and islanders' desire to exert pressure on major greenhouse gas emitters to provide an alternative to carbon-intensive economies. Most importantly, the impetus for this action is typically driven by islanders themselves and represents the coalescence of multiple kinds of island innovations.

There are two central themes of research in this study. It will first examine ideas of economic competitiveness in SIDS development and their relationship to neoliberal globalization. The review identifies trends in development literature and provides insight into the place of SIDS in economic discourse as weak and vulnerable, and then turns to alternative theories that have been presented. This knowledge is vital for understanding the mechanisms for development and the special cases of SIDS. Secondly, the environmental politics literature informs our understanding of SIDS' role in global

climate discourse. It sheds light on how environmental change has given SIDS new agency both locally and on the international stage and how they are using this opportunity to take an increased role in international affairs.

2.1 Competitiveness in Small Island Developing States

Sustainable development is a vital concern for SIDS, which have traditionally been seen as uncompetitive and facing barriers that exclude any real opportunity for growth. The private sectors of small countries are seen as fundamentally disadvantaged due to globalization, preventing them from generating competitive exports or attracting significant amounts of foreign investment.

The isolated geography of SIDS is inevitably tied to theories of development. The conventional wisdom holds out that isolation and small population are the primary dictators preventing robust economic development. For example, Winters & Martins (2004) directly examine through quantitative analysis claims that high costs of transportation to the rest of the world inhibit small remote countries. The paper hypothesizes that small remote places are inherently uncompetitive due to factors such as the high transportation costs. It uses several techniques to focus on remoteness and differentiate that effect from size, but concedes it is impossible to fully differentiate these two factors and that SIDS and SNIJs, which "face such great absolute disadvantages that exporting at world prices is either impossible or generates factor incomes that are too low to subsist" (p348). There is no shortage of research that suggests SIDS suffer from smallness and isolation. Research such as Briguglio (1995) and Guillaumont (2010) conclude that small size and demographic factors impact vulnerability and these are the main barriers to development and participation in the global economic system for small states. Winters & Martins ultimately argue that "free trade could mean no trade for these economies" (p348).

Not all academics agree that smallness equates to stunted growth. Easterly & Kraay (2000) state that small states have "received excessive attention from the literature", highlighting an emphasis on their vulnerability is unwarranted as they seem to often have higher incomes per capita than their mainland neighbors and that there is no evidence of lower growth rates. They continue to say that policy advice for small states should be no different from those of larger states. However, the focus is on the smallness of states, and does assess the effects of isolation or transportation difficulties, which would have different impacts on Pacific SIDS than other small countries such as Luxembourg and Djibouti. Selwyn (1980) argues that the category of islands is an illegitimate social construct that has little impact on an economy. This critique argues that peripherality and marginalization are important factors in economic development, but the impact is no different to that of a remoter mainland area.

This discussion of smallness often discounts alternatives and perpetuates the idea that smallness equates to vulnerability and low growth. Amoamo (2011) argues that the framing of islands as fragile, small, peripheral and dependent is often assumed, and is entwined with the discourse of vulnerability. Baldacchino (2015) contends that the very idea of independence for many small states was seen as extravagant and precarious both before and after the event, and colonial powers doubted economic or political viability. Concerns over independent states' involvement in global politics were also outlined, and colonial powers often feared the loss of support from their former colonies. Baldacchino then argues that the belittling nature of discussion around SIDS maintains this negative discourse.

The vulnerability discourse in political economy and development studies has led to the development of the migration-remittances, aid-bureaucracy (MIRAB) economy as the fundamental development model, whereby economies rely almost entirely on the outflow of their population to send back money and the inflow of foreign aid with associated public sector workforce to power their economy (Bertram

& Walters, 1985). Authors such as Poirine (1998) & Bertram (2004) have pointed out that MIRAB represents a useful mode of development for Pacific SIDS to use the only competitive advantages they may have, based on a population able to emigrate for work and to build a diaspora that can lobby for aid. Likewise, Connell (2013) insists MIRAB has ensured the continued viability of many of the smallest nations, including Tokelau.

Many neoliberal economists have been critical of the MIRAB model as a valid pathway to sustainable development (McKee & Tisdell, 1988). This has caused the exertion of pressure on small countries to comply with principles of free trade and join organizations such as the World Trade Organization (WTO). Wallis (2010) assessed Tonga's accession to the WTO and concludes the costs outweigh the benefits, and the neoliberal agenda has damaged the economy of Tonga. Furthermore, no transition away from a remittance and aid dependent economy was achieved, supporting the conclusion that a neoliberal approach is inappropriate for small Pacific economies. This approach sees insularity as a problem without recognizing the threat of global integration to PICTs, which otherwise might protect their economies through astute trade preferences; though their ability to do so has declined dramatically as they have signed on to global and regional trade accords.

Connell (2013) states that "islanders have sought to develop cultural continuity with social change and economic development" and concludes that a form of hybridity can be found to maximize benefits to island communities, merging indigenous practices with capitalism. He discusses proactive and opportunistic islanders crafting their own destiny in the face of serious challenges as a suitable way of negotiating the risks of interacting with a neoliberal economy and an increasingly globalizing world. Connell argues that the neoliberal perspective neglects the islanders' own advantages and contributions to their own destiny, and that SIDS can exert agency and not be held back by many of

the problems faced by larger globalized economies. In this way, islanders can tackle the problems that specifically affect them most such as climate change through innovations using island advantages.

Building from these assertions, SIDS are also conceptualized as places for development and entrepreneurship and laboratories of innovation in which small jurisdictions and insularity encourage resourcefulness and entrepreneurship, suggesting that there is much more to island survival than a MIRAB economy where innovation is a local response to tackle global issues to suit island needs (Kelman et al., 2015). Baldacchino (2015) compiled the first publication to consider islands wholly in the context of entrepreneurship, identifying the political categorization of sub-national island jurisdictions (SNIJs) as a source of innovation and the advantages and disadvantages islanders face in innovation. Diaspora is a second source of entrepreneurship and innovation. This paper outlines three categories of innovation from islanders: entrepreneurship in small business, new governance structures, and developing new cultural practices. Limited resources combined with island thinking are seen as the key drivers of innovation.

These responses to the conventional wisdom of non-competitiveness and marginality highlight the ways that islanders are central to their own future and have agency to make their own choices. According to Baldacchino (2015), "all too often, one is here faced with a situation in which the... the islander… becomes object matter: a 'looked at' reference group; stages for the enactment of processes dictated from elsewhere" (p. 7). Many of these authors see islanders as succeeding in entrepreneurship outside of the neoliberal framework and continuing to innovate. This research exists mostly in cold-water SNIJs such as Prince Edward Island and Iceland, and neglects many of the cultural and geographical nuances of the Pacific.

Specifically, the gap that this paper contributes to is linking innovation to renewable energy in the Pacific region, and to the wider discourse of climate change – and more broadly, how global environmental politics yield opportunities for agency and innovation. Many of the attributes of islandness have led this region to become a world leader in developing sustainable energy, yet it has been relatively neglected by academic scholarship. Where it has been covered, the projects are seen as the achievements of outsiders, and little credit has been given to islanders themselves. This paper assesses how SIDS in the Pacific have exerted agency to change this discourse, and specifically how Tokelau was able to drive its own renewable future with indigenous thinking and to achieve 100% of its electricity generation from solar.

2.2 Islands and global environmental politics

The review above leads to the conclusion that small states are not generally considered to impact the agenda of superpowers, or more generally the direction of global geopolitics. However, Bernal (2015), as Jamaican Ambassador to Washington, refutes this with his analysis of Jamaica's impact on United States foreign policy through his experience as Jamaican Ambassador to Washington. Bernal argues against the conventional wisdom that small developing states exert limited influence on the behaviors of large superpowers such as the United States, and that their actions and affairs are routinely disregarded by these superpowers. Through the Jamaican-US case study, he illustrates the impact that small nations can have on large nations through building influential diaspora and retaining the links to these communities once established. Jamaica was able to mobilize support for its interests on Capitol Hill and receive some preferential trade treatment and significant debt relief, including one of the first debt-for-nature swaps.

This is a useful parallel to SIDS' process of becoming a key part of dialogue in global environmental politics; they have used the global environmental agenda to express agency in the discussion and affect policy change. Despite only registering 5% of the world's population, SIDS make up over 20% of the United Nations member states, and so have an advantage in numbers and vote at key events and have played a role disproportionate to their size and strength at international climate negotiations (Barnett, 2005). For example, small states are well known to be courted by pro-whaling powers such as Japan in the International Whaling Commission and to leverage their votes for foreign aid (Strand and Tuman 2012). The small economies of SIDS mean that relatively small investments of foreign aid can be very important for their economies, and so this innovation in vote exchange is an important method for them to raise funds, though which they are also impacting international environmental politics.

The formation of the Association of Small Islands States (AOSIS) in 1990 has been a fundamental driver of SIDS voices and has succeeded in getting its discourse in the final agreements at climate negotiations (de Águeda Corneloup & Mol, 2014). AOSIS and SIDS generally lack structural power available to large state actors so must find leadership in other ways but have been able to use moral arguments and environmental leadership strategies to influence opinions and make their voices heard (de Águeda Corneloup & Mol, 2014). SIDS governments seek to achieve discursive hegemony by building coalitions such as AOSIS to promote their story to the top of the agenda and using scientific support to bolster claims. SIDS such as Tuvalu have also succeeded in driving an emotional story that has helped to generate sympathetic public opinion in their favor (Farbotko & McGregor, 2010). This is a form of entrepreneurial leadership innovation (de Águeda Corneloup & Mol, 2014).

Shibuya (1996) shows the origin of the island voice on climate change and the course that it followed since the early 1990s and that AOSIS played a major part in getting global attention to the issue of

climate change by using low lying islands as a crisis issue. Farbotko and McGregor (2010) describe how the Tuvalu delegation successfully forced a suspension of the Copenhagen conference by leading a walk-out. However, the extent and scope of SIDS influence has limits. De Águeda Corneloup & Mol (2014) point out that at COP15 "the entrepreneurial leadership strategies of SIDS were forcefully overruled by the structural power of the large Annex-1 states and the emerging economies" (p. 290). This appears to have changed at COP21 with greater success by AOSIS, though it is too early to see the results and the complex international politics makes it almost impossible to isolate and identify a single driver of outcomes.

At the United Nations, AOSIS has been the main representative of island voices, but other international groupings have been important in shaping the discourse and forming lobbying groups in the international political arena. The African, Caribbean & Pacific (ACP) group of states was created by the Georgetown Agreement in 1975 and the small vulnerable economies (SVE) informal grouping used by the World Trade Organization (WTO), but neither of these are exclusively island groupings (Birkbeck & Harbourd, 2011). The ACP started as an alliance of former European colonies and protectorates to enhance members' economic development and global integration. This encouraged some South-South cooperation between the members, but primarily allowed them to negotiate preferential trade agreements with the European Union. These agreements were questioned by the United States as a violation of free trade under the WTO, and subsequently the benefits offered to many SIDS were reduced. For example, the preferential treatment given to Caribbean countries had allowed the continuation of many smaller plantations on islands that would be uncompetitive when forced to compete in a free world market (Anania, 2010). The reductions of preferences to many Caribbean SIDS damaged their banana exports once preferences were lifted and they were forced to compete with cheaper Central American products.

By contrast, island dependencies and territories have not had an independent platform to voice their views. The United States, Australia, the United Kingdom, France and New Zealand all retain control over island territories in the Pacific region, and political associations of these states with their territories affect the capacity of the territory to respond to climate change discourse (Barnett, 2005). Each territory has a unique relationship with its main power and Grydehøj (2011) argues that the governments of SNIJs are disproportionately large but can be used both to the advantage or disadvantage of the population according to this relationship and its level of democratic responsiveness. McElroy & Pearce (2006) argue that SNIJs have an advantage over similar sovereign nations that leads to a superior economic performance and better quality of life due to the astute use of their autonomous privileges. In some cases, this leads to islanders repeatedly voting to retain their status quo of semi-autonomous political status, lacking full sovereignty and decision-making power.

In the Pacific, several international organizations enable island states to advocate for island issues through regional cooperation; these include the Pacific Islands Forum (PIF), Secretariat of the Pacific Regional Environmental Program (SPREP) and the Pacific Islands Forum Fisheries Agency (FFA). However, the diversity of island voices and distinct interests within the Pacific can be a challenge for the development of a unified front (Barnett, 2005). SNIJs have had varying success in engaging with these forums. For example, those with greater autonomy such as Niue and the Cook Islands can effectively represent themselves at international forums but others with less constitutional autonomy on foreign relations such as Pitcairn Island and Tokelau are often beholden to the views of the larger political power of which they are a part. PIF has Niue and the Cook Islands as full members, French Polynesia and New Caledonia as associate members and Wallis and Futuna, Tokelau, American Samoa and Guam as observer members, distinguishing the level of participation based on the political status of the island. Australia and New Zealand are also full member states. These eight SNIJs are also

represented as full members of SPREP, along with the associated developed countries of United Kingdom, United States, Australia, New Zealand and France. Pitcairn Island, the only Pacific territory of the UK, is directly represented in neither body. There is a dearth of literature analyzing the ways that the populations of these SNIJs participate in the global decision-making framework on environmental issues, the factors that influence the nature of their participation and the ways that they innovate to achieve their policy objectives by navigating the political relationships that SNIJ status presents.

SNIJs like Tokelau are represented at global UN negotiations by their associated UN member, but may find that their views do not directly align with those of the member state that represents them. At UN conferences, Tokelau generally finds itself more allied with the AOSIS coalition, but its constitutional relationship with New Zealand limits its ability to directly act on the decisions it would like to happen. By working with associated groups such as PIF and SPREP, SNIJs like Tokelau are able to still have their agenda heard through the voices of other member states. The Coalition of low lying Atoll Nations on Climate Change (CANCC) has also given Tokelau a platform to promote its cause by allying with the sovereign nations of Kiribati, the Marshall Islands, the Maldives and Tuvalu. As Tokelau is the only CANCC member without a vote at the UN, this has become a new platform to develop an independent voice away from New Zealand with support from sovereign nations with aligned interests. The navigation of these various negotiating platforms is an important political innovation that Tokelau, and other SNIJs, have developed to have their interests represented.

SIDS engagements with these organizations are dynamic and rapidly evolving, making it difficult for researchers to keep track of the quickly changing pace of international climate negotiations. There is little academic writing available on the role of SNIJs at global climate negotiations despite their

important roles and contributions to the debate through moral leadership. There is also no research on Tokelau's role, despite its leadership, and the advantages and disadvantages that its constitutional relationship with New Zealand offers. This study contributes to filling these gaps by identifying the kinds of innovations at play in Tokelau's effort to developing political and navigate global climate politics in a Pacific context.

Chapter 3: The story of Tokelau

"The thing that the elders are certain about is that Fakaofo won in the end; Nukunonu was conquered and the people who had lived in Atafu fled away upon the ocean"

-Matagi Tokelau: History and Traditions of Tokelau (Office for Tokelau Affairs, 1991)

3.1 Physical setting

Any conversation of Tokelau with an outsider must first confront the remoteness of the islands. The Pacific is a sea of remote islands, but Tokelau's isolation as an entire nation stands out in a way perhaps only paralleled in the Pacific Ocean by that of Pitcairn Island. Tokelau's entire existence is orientated around its remoteness and connection to the sea. Tokelau's 12km^2 of land area make it the smallest in size of the non-self-governing territories in the Pacific, and the atolls are so low-lying that they can barely be seen from just a few miles off shore.

The atolls each have large central lagoons, far greater in area than the narrow sandy strips of land that surround them. Each is fully encircled by a barrier reef, and there are no deep water channels between the atolls and the open ocean. The atolls have no naturally occurring freshwater, except the thin freshwater lenses that collect just below the surface from rainwater falling on the land area that can be accessed through shallow wells. The main food crops include coconut, breadfruit and pandanus, with fish, turtles, sea birds and coconut crab also supplementing the traditional local diet.

The three atolls of Atafu, Nukunonu and Fakaofo share a common language and political system but are almost as remote and inaccessible from each other as from the nearest transport hub in Samoa.

Tokelauans are banned from travelling between them on their personal transport due to the number of islanders who were lost at sea making the long crossings. If Tokelau has a corresponding 'mainland', the closest would be Samoa. Tokelau has no airport and so to access the islands one must fly to Samoa and take the forty-eight hour 500km crossing on the ferry that leaves once a fortnight. The boat itself is renowned for being an uncomfortable ride, and is essentially a cargo vessel with room made on the deck for passengers. All ships must anchor in the open ocean and use small boats to transfer food to land, where islanders, a forklift or mobile crane transfer cargo onto island trucks.

A fourth atoll, called Olohega or Swains Island lies between Tokelau and Samoa. The island is historically and culturally part of Tokelau, but in 1856 an American named Eli Hutchinson Jennings established a coconut plantation on the island. Jennings and his ancestors effectively ruled the island as a semi-independent dynasty until the 1920s, although it was later officially claimed by the United States under the 1860 Guano Islands Act and is now administered as part of the territory of American Samoa. While many Tokelauans continue to claim Olohega as an integral part of Tokelau's territory to this day, this is not recognized by New Zealand or the United States.

3.2 Pre-colonial history

Archaeological evidence and Tokelauan oral history indicate that the atolls were most likely settled between 700 and 1000 years ago, although there is evidence of some human settlement on Olohega as far back as 500AD. The islands were most likely sporadically inhabited for the first few centuries, but by the time Europeans arrived there was already an established indigenous settlement on the islands. It is unknown when exactly each island became permanently settled, but genealogies suggest at least six generations had lived there prior to the arrival of blackbirders in 1863 who enslaved much of the population (Molloy & Hunstman, 1996).

Precolonial history was complex and dynamic, and very different to the timeless image of harmonious Polynesians living idyllic lives under the coconut trees portrayed by many visitors to the South Pacific at that time. In the late 1700s, the atolls of Tokelau existed as a Polynesian kingdom under the hegemony of the Chiefs of Fakaofo, who conquered Nukunonu and destroyed the village on Atafu. These mutually hostile atolls were expected to pay tribute and send women to Fakaofo, causing disputes to erupt periodically. At around the year 1800, Nukunonu was still subjugated whilst Atafu was repopulated by settlers from Fakaofo. Olohega was an outpost with settlers from Fakaofo exporting produce back to the dominant atoll.

European exploration of the atolls was spread from 1765 until 1825 but had little impact on the local population until the 1840s. Fakaofo's dominance was first challenged in the 1850s and a famine drastically reduced its population. In 1861, the two subordinate atolls of Atafu and Nukunonu converted to Christianity in an explicit rejection of Fakaofo's gods and their dominance. Catholic missionaries gained the most influence on Nukunonu as a returning island convert spread the faith, paving the way for missionaries. In Atafu missionaries arrived from the protestant London Missionary Society (LMS). Meanwhile, Olohega moved into private ownership with the arrival of Jennings and his plantation business.

Fakaofo rejected foreign missionaries until 1863 when the island suffered another devastating decline in population, this time due to the arrival of blackbirding ships from Peru which were raiding islands across the Pacific to find slaves for the mines of South America. Tokelau was one of the worst affected areas in the region, reducing the populations of Fakaofo and Nukunonu by around 50% to 200 and 63 respectively by the end of 1863 (Maude, 1981). This drop in population was the fall of Fakaofo's supremacy and preceded the arrival of missionaries who received little resistance after the removal of

so many island men. Given the relatively larger size of the island population, both LMS and Catholic missionaries arrived in Fakaofo, who were also joined by some additional male settlers from Portugal and Samoa who assimilated into the local population and helped with its recovery. Following the decimation of the population and colonialism the struggle for dominance between the islands became less pronounced (Hoëm, 2015).

This pre-contact history shows that Tokelau had a dynamic political history for centuries, and did not exist as a single polity with equal island power until modern times. The social differences between the atolls continue to exist today and impact contemporary local politics as each atoll council insisting they must be treated equally without preference given to the others, while equally competing for their own preferential treatment. This local politics has an impact on the development of the islands and is one of the reasons an airport was never constructed on the islands. It would be politically challenging and culturally impossible to allow the construction of an airport on one atoll lest it gain an advantage over the other two, while also being financially impractical to construct airstrips on all three islands.

3.3 The British Empire to 1948[5]

At the point of colonization by Europeans, each atoll had maintained its own unique culture. However, to outsiders these were seen as homogenous communities and they were grouped into a single entity under colonial rule. In 1877 the islands, then known as the Union Islands, fell under the protection of the United Kingdom with the Western Pacific Order, which established a High Commissioner to the Western Pacific, responsible for jurisdiction of British subjects on unclaimed islands in the region. This was partly a response to the episodes of blackbirding in the region to give greater protection to

[5] This section draws heavily on Angelo & Pasikale (2008).

Pacific Islanders from marauding vessels. In 1889 the islands were officially incorporated into the British Empire as a protectorate, and the Union Jack was raised on Nukunonu, Atafu and Fakaofo. In 1916 the Union Islands were incorporated into the Gilbert and Ellice Islands Colony. During this period the islands remained a largely subsistence economy with traditional governance by the island chiefs, although with strong influence from missionaries.

In 1926 the Tokelau Islands were disannexed from the British Gilbert and Ellice Islands Colony and came under the administration of New Zealand as part of Western Samoa, which had been given to New Zealand from Germany by mandate of the United Nations. The Tokelauan chain was largely neglected by New Zealand during this period with occasional visits from a New Zealand administrator and trading ships collecting copra. Services were largely provided by the missions and were rudimentary.

Tokelau formally became part of New Zealand on January 1, 1949, and islanders became New Zealand citizens according to the British Nationality and New Zealand Citizenship Act (1948), in line with the changing relationship between the United Kingdom and New Zealand and formation of New Zealand citizenship. The Letters Patent Constituting the Officer of Governor-General of New Zealand (1983) split the Realm of New Zealand into five parts: the state of New Zealand, the self-governing states of the Cook Islands and Niue, the Ross Dependency (a dependency of the state of New Zealand) and Tokelau (a territory of the state of New Zealand).

Tokelau's modern relationship with New Zealand has defined its current existence and allowed it to receive special preference in many areas. If the islands had remained as an outlying jurisdiction of a neighboring SIDS that they were once grouped with under colonial rule, such as modern Kiribati,

Samoa or Tuvalu, they could have remained marginalized parts of these countries with little agency to express themselves internationally. In these modern states, outer islands continue to be underdeveloped and inaccessible compared to their capital island and Tokelau could have risked a similar fate, particularly given its status as a cultural and linguistic minority group. Instead, as a SNIJ of New Zealand, they have been able to carve their own brand as a somewhat autonomous nation, with the benefits of association with a larger, richer power.

3.4 The independence debate[6]

New Zealand began to invest in island development from the 1950s in areas such as transport, communications, education and health. In 1962 the UN's 'Declaration on the Independence of Colonial Peoples', New Zealand increased the amount of self-government given to the islands, leading to the devolution of many political powers and increased provision of services. When Western Samoa gained its independence in 1962, Tokelau was given the choice to join them in independence or affiliate with the Cook Islands, but Tokelau asked to continue its current relationship with New Zealand as a discrete dependent entity. This caused a wave of migration leading to the development of the Tokelauan diaspora in New Zealand, where they held legal right to live due to citizenship.

In 1980, the United States and New Zealand signed the Treaty of Tokehega, in which the United States relinquished its claims over Fakaofo, Atafu and Nukunonu, but asserted American sovereignty over Olohega. Although each of the Tokelauan Faipule signed this treaty, there have been claims this was under extreme pressure from New Zealand and that the islanders overall did not want to lose an island they viewed as part of Tokelau. The claim resurfaced in 2006 when a draft constitution that was

[6] Huntsman & Kalolo (2007) outline the relationship between Tokelau and New Zealand, documenting the influence of the United Nations leading up to the independence referenda.

the subject of the 2006 self-determination referendum confirmed Tokelau's continued claim over Olohega. Some Tokelauans continue to accuse New Zealand of ignoring Tokelauan viewpoints in signing this treaty and giving local officials little option but to sign the agreement, illustrating the tension that can be felt between the relationship of state and territory (Tagata Pasifika, 2009).

The creation of Tokelau as its own separate jurisdiction paved the way for the concept of nationhood. Subsequent amendments and additional laws gradually increased autonomy and in 1994 powers were delegated from the Administrator to the General Fono, moving Tokelau from under New Zealand Administration to Self-Government within New Zealand. The General Fono were given full national law making power in 1996, although remained subordinate to the New Zealand Parliament who could override their decisions. This even allowed Tokelau to engage in its first independent international relations, and in 1996 it signed an MOU with the Government of Tuvalu on possible methods for cooperation between the two atoll nations. Tokelau has also participated fully with and independently from New Zealand in regional organizations such as the Forum Fisheries Agency, the Secretariat of the Pacific Community, the Secretariat of the Pacific Regional Environmental Program, and the Council of the University of the South Pacific. The Pacific Islands Forum granted Tokelau observer status in 2005.

Tokelau became an anomaly that is still unresolved as the two referendums on the islands' self-governance failed to gather the support needed to pass. This was a much different path to Niue and the Cook Islands, which originated from similar political arrangements but became self-governing in free association with New Zealand in 1974 and 1965 respectively. Tokelau was urged by the UN to follow this path, which would retain the coveted New Zealand citizenship and financial support.

However, reassurance of this protection failed to assuage worries of the wary Tokelauans, and the status quo remained, much to the consternation of New Zealand and the UN.

As the second smallest territory falling under the United Nations Special Committee on Decolonization, Tokelau went through two UN mandated referendums to determine its future status. This committee was established in 1961 in order to oversee the decolonization process in the various remaining colonial entities existing around the world. There are 3 ways for a colony to self-determine: independence, free association, or integration. Tokelau's politicians elected to vote to become a state in free association with New Zealand, like Niue and the Cook Islands, and this change in status was to be established by referendum. As a state in a free association, Tokelauans would retain New Zealand citizenship and New Zealand would continue to provide defense and economic assistance to the islands.

The first referendum in 2006 lacked just 35 votes to meet the two-thirds majority required to pass, and so the islands maintained their current status. This very narrow margin led to a second referendum in 2007, as Tokelauan leaders were concerned that expatriates influenced the decision, despite their ineligibility to vote. This second referendum also failed, by an even smaller margin of just 16 votes. Politicians have since called for another referendum, asking for it to be decided by a simple majority which would likely pass in favor of free association. The main reasons indicated by those who voted against free association were a concern that it could affect their New Zealand citizenship, and thus the ability to move and work freely between the nations. However, most Tokelauan and New Zealand politicians supported the move and tried to assuage these fears through community outreach in both countries.

Unlike the Cook Islands and Niue, Tokelau is not officially classified by the UN as a SIDS, due to its constitutional relationship with New Zealand. Although the former two countries are not formal members, they have full treaty-making capacity recognized by the United Nations. At most UN talks, Tokelau has been represented as part of New Zealand sometimes without a Tokelauan member on the New Zealand delegation. At other times, New Zealand has allowed Tokelau to take center stage, such as the UN SIDS conference where the Tokelauan political leader, the Ulu o Tokelau, represented New Zealand at the opening speeches (Nasau, 2014). Tokelau has also attended UNFCCC conferences as part of the New Zealand delegation. The Ulu of Tokelau announced the Tokelau Renewable Energy Project (TREP) at the COP17 Durban Conference and was able to do so in a way that appeared independent of New Zealand. In taking this strategy, Tokelau is able to maximize the utility it gets from working with New Zealand, and also sometimes appearing as an independent entity.

3.5 Tokelauan society

Traditionally there existed a complex hierarchical social structure both between and within islands. Hooper & Huntsman (1991) characterize the traditional island relationships in terms of traditional family structure, with Fakaofo as the oldest brother, Atafu the younger brother and Nukunonu the sister's son. Tokelauan identities are still often constructed around the kaiga, or family groups, and responsibility to the home atolls, rather than allegiance to Tokelau as a whole. Like other Polynesian societies, kinship is an important part of the socio-political makeup of Tokelau, and the kaiga control and allocate many resources within the islands. The fakaTokelau, or Tokelauan way, resembles an ancient quasi-communist system whereby everyone gets a basic wage and is required to work for the community. In addition to their different religions, each atoll has its own variation of fakaTokelau, with acute cultural differences, and the inati, a Tokelauan way of sharing fish catches fairly among the community.

The geographical nature of the three islands with similar sized populations have given rise to a unique political structure, whereby the Ulu rotates annually to each island, with the Faipule of Nukunonu, Fakaofo and Atafu each holding the title for one year. The Faipule terms are three years, so after each has been overall chief for a year elections are held by each island and the cycle is repeated. The historic domination of Fakaofo means that each island is reluctant to give the other island more importance than the other, and so Tokelau has no official capital. In fact, Tokelau's administration is entirely based out of Apia, Samoa. Samoa is not just the origin of the only scheduled vessel to the islands but a cultural origin of missionaries and priests since colonization, and the Samoan language is widely spoken in Tokelau. The ferry that visits the islands is also the only means of inter-atoll transportation, thus there are few opportunities to encourage inter-atoll trade.

The Tokelau Public Service employs the majority of islanders, with the rest mostly working for the Taupulega, as the islands are home to little private industry. In the past, copra provided a major export crop but has not been economically viable to export for many years. Annual GDP is US$1.5 million and New Zealand funds most of government costs. Income from fishing licenses in the EEZ are the second biggest contribution to government funds. Many households supplement their income with remittances from family in New Zealand and Australia. The Tokelau International Trust Fund is another important economic support mechanism, and aims to support the long-term financial sustainability of the islands and has a value of over US$50 million (Government of Tokelau, 2014).

This economic reliance on New Zealand created a close relationship enabling the Government of Tokelau to request a loan to cover the costs of the Tokelau Renewable Energy Project (TREP). This was in accordance with the existing aid-reliant economy of Tokelau, and a natural source of the funds. It did also limit Tokelau in sourcing the money, as if New Zealand had been unwilling to provide them

there could have been few additional options remaining. The fakaTokelau also influenced the project, and shaped the entrepreneurship process. In Tokelau, things move slowly and cautiously, and there is little appetite for risk-taking. This is somewhat of a paradox, as it was a pioneer of renewable energy in the region, but could be explained by the urgency that came from the high electricity prices and from climate change. Tokelau also initiated the process of exploring renewables very early, with prototype projects installed in 2002 to prove to the islands the value of the technology.

3.6 The diaspora

There are more Tokelauans living in the diaspora than on the atolls themselves. There are some 7,000 living in New Zealand and others in Hawai'i, Australia and worldwide. Tokelauans have long travelled around the Pacific, for religious training in Samoa and Tuvalu and further afield as missionaries. As full New Zealand citizens, Tokelauans have the right to move between New Zealand and their atolls and also some rights to live and work in Australia. Tokelauans living on Olohega became American citizens, with most migrating to American Samoa and many establishing communities in Hawaii and California.

In 1951 only ten Tokelauans lived in New Zealand, but in the following decades thousands of islanders left their homeland for the promise of a better life. Conditions on the islands deteriorated after the impact of a severe hurricane in February 1966, leading to New Zealand's creation of the Tokelau Islands Resettlement Scheme, and the government viewed the island communities as moribund. By 1975 Tokelauans in New Zealand outnumbered those living on the atolls and the scheme was abandoned as the New Zealand government decided people should continue to live on the islands.

Another factor was the independence of Western Samoa in 1962, as many Tokelauans were living in Apia at the time. Most of those living in Samoa at the time of independence became aliens in a foreign land and relocated to New Zealand. As citizens of New Zealand, Tokelauans were not legally subject to the same persecution as other Pacific Islanders, but as non-white immigrants were considered suspect by many of their compatriots. These problems on moving to New Zealand encouraged the formation of a tight-knit diaspora with a strong connection to their homeland.

Despite representing just 0.02% of the New Zealand population, the Tokelauan community has retained its distinct culture and has a strong presence in public life. Tokelauans are concentrated around the capital of Wellington, unlike most other Pasifika groups which have stronger presences in Auckland. There is an annual Tokelau festival in Porirua, a Wellington suburb, and members of the diaspora visit from all over the world. The same city elected Kris Faafoi, the first MP of Tokelauan descent in New Zealand, who was born to migrants from Fakaofo.

Tokelau's continued relationship with the New Zealand diaspora has shaped its modern relations with a strong group to lobby for the islands in Wellington, which Bernal (2015) argues is essential for small states wanting to influence the policy of larger powers. Most Tokelauans have also spent time either living or working in New Zealand, and normally for longer periods due the cost and timing of transport. However, this relationship has also been harmful for Tokelau with a consistent brain drain of skilled workers, including those with the ability to repair and operate renewable energy systems.

3.7 Climate change

Sea level rise attributed to climate change is a problem facing countries worldwide, but is felt no more acutely than in atoll nations (IPPC, 2007). Kiribati, the Marshall Islands, the Maldives and Tokelau are

all nations at risk of disappearing entirely under the waves as global sea levels rise, residing just a few meters above the water. Ice sheets contain enormous quantities of frozen water, and if the Greenland Ice Sheet alone melted scientists estimate that sea levels could rise about 6 meters. Additionally, if the Antarctic Ice Sheet melted, sea level could rise by up to 60 meters (IPCC, 2014). Though this scenario is unlikely in the short term, Tokelau would only need a one-meter rise in sea level to lose most of its land area and make the islands uninhabitable.

There are inconsistent explanations of the effects of sea level rise on atolls with some predicting a chronic increase in erosion and sea level rise (Dickinson, 1997) while others suggest that living reefs are resilient to climate change and could endure rising sea levels (Kench et al., 2005). Kench suggests that atolls are more dynamic that most people expect, and could keep up with a rapidly rising sea level as deposition occurs, but acknowledges this does not negate the serious environmental consequences of rising sea levels. It is likely that the permanent structures built on the islands could face serious damage, and would be unlikely to survive the changing geomorphology of the islands. This uncertainty adds an extra challenge for adaptation strategies in these countries.

Regardless of the future existence of the atolls themselves, it is clear that there are significant issues regarding climate change facing their inhabitants. Atolls have no surface running water and rely entirely on harvesting groundwater that collects in a freshwater lens, which is supplemented by precipitation. Freshwater lenses are particularly vulnerable to contamination, and so in many islands the water supply is becoming polluted, endangering the population's long term health, particularly in times of drought (IPPC, 2007). Coral bleaching and ocean acidification could also cause issues and reduce atolls' ability to rebuild themselves, and more frequent tropical storms could increase erosion.

Tokelau recognized its extreme vulnerability to climate change as far back as 1993, and has taken important steps to prepare for the issues that could arise because of this. The islands' dispersed population means that engineering structures such as sea walls would be impractical and prohibitively expensive, but careful monitoring was started and safe houses constructed on each island for storms and high tides. Tokelau has also embraced international climate negotiations as an adaptation and mitigation strategy. By joining a chorus of other SIDS to argue for global reductions in greenhouse gas emissions, Tokelau has found a way both to potentially help reduce the impact of climate change on its islands, but also attract funding from larger countries to aid its adaptation strategies.

Chapter 4: The Tokelau Renewable Energy Project

""We are here to convey the message that nowhere in all of these meetings, has Tokelau been able to have a voice in the policy development for adaptation and mitigation for climate change. We are part of that group of vulnerable nations most affected by climate change and yet do not have a presence within the formal discussions at the COP sessions."

-Aliki Faipule Foua Toloa at the COP17 (2011)

4.1 Background

The Tokelau Renewable Energy Project (TREP) was the culmination of years of careful planning and test projects that reflect the fakaTokelau, or Tokelauan way, which involves careful consideration and due process, taking a slow approach to ensure it works and no rash decisions (Huntsman & Kalolo, 2007). Tokelau's first National Energy Policy and Strategic Action Planning (NEPSAP) in 2004 established a target for 100% renewable generation and energy independence (IRENA). The original proposals for 100% renewable included a coconut biofuel source of generation for backup, which was initially used rarely as the batteries themselves had enough capacity to provide sufficient storage.

Prior to the installation of TREP, there were limited other renewables installations in Tokelau. The University of the South Pacific on Atafu had a small solar array and the telecommunications company TeleTok had panels powering its transmission stations. Diesel generators were used on each atoll to provide electricity, requiring annual imports of over 2,000 oil drums at the cost of NZ$1 million (Empower Consultants, 2008). Large volumes of diesel to power each unit were shipped on from Samoa, and the high cost of this fuel was a primary motivator for looking for other methods of

generation. Additionally, the risk posed by diesel spills damaging the fragile reef environment was an incentive to reduce diesel imports.

In 2001, the United Nations Development Program (UNDP) partnered with the Government of Tokelau to fund a pilot program to explore the feasibility of renewable energy sources on the islands (UNDP Suva, 2012). After several design iterations with input from the Government of Tokelau and external experts, a tender was issued in 2004 for a single pilot project in Fakaofo valued at US$320,000. Although the General Fono originally intended for a project on each atoll, budget limitations restricted the pilot to Fakaofo (Wade, 2004). The small 10kW project was initially a separate micro-grid which was later integrated into the island grid, helping prove to islanders that the technology could be used efficiently alongside the existing infrastructure.

The TREP project itself was started in 2010 as a partnership between the Government of Tokelau (GoT) and the New Zealand Ministry of Foreign Affairs and Trade (MFaT). The project culminated after a 5-month construction period ending in October 2012. For the construction, the GoT approached MFaT for a NZ$7 million loan. The 4,000 photovoltaic cells charge 1,300 lead-acid batteries and the systems were designed to meet 150% of the community's energy needs. A New Zealand installation company, PowerSmart Solar NZ Ltd., was contracted by MFaT to install the system, with the assistance of IT Power (Australia) Pty Ltd. There was little to no expertise or experience with renewables on Tokelau, requiring the use of specialists brought in from New Zealand to provide training to Tokelauans (IT Power, 2013).

The arrival of this project created profound cultural changes in Tokelau, as 24-hour electricity became available on the islands instead of the previous six hours per day. This drastically improved living

conditions by allowing increased access to the internet and improved education opportunities, factors which in turn contributed to encouraging young Tokelauans to stay on the islands. They also previously had to have someone watching the generators at all times while running, and the solar panels allowed less time actively watching them.

However, there were some problems presented with the system, for example, the phenomenon of diesel creep. As electricity became available round the clock, demand increased for appliances such as freezers and electricity demand skyrocketed, meaning more diesel was needed to provide backup than originally anticipated. The plan to use coconut biodiesel to power this backup proved unfeasible due to its technological complexity, and some level of conventional fossil fuels were still needed for import. Despite the need for some diesel backup, media reports and island officials still continue to claim the title of 100% renewable, and to claim to be the first country to hold this position. Tokelauan government representatives have not claimed this title as an important mechanism for positioning Tokelau on the global climate stage, and necessary for its achievement to garner both local and global impacts from the project. The rest of the analysis draws out the multiple kinds of innovations that Tokelau developed, on its own and in relations with UNDP, New Zealand and through global negotiations to secure and stabilize the project and use it to move into a leadership position in climate negotiations.

4.2 Tokelau's political rationale

The political economy of electricity generation in the lead up to TREP in Tokelau relied upon the development of local, national and global innovations that all worked through the SIDS context in varying ways. At the global level, the islands' dependence on imported fuel created an inability to insulate themselves from global oil price shocks. Transportation delays due to bad weather also had

the potential to leave the islands without electricity. The user tariffs paid by residents for electricity were set at a national level but additionally required agreements from all three atoll Taupulega. Thus, pressure and resistance from community members limited the ability of politicians to increase the electricity tariff. Energy wasting was commonplace and the low price of electricity did little to encourage energy conservation. Combined with inefficient devices, it was clear there was a need to increase electricity prices, and the unique situation forced the government to find innovative ways of continuing to supply electricity to the islands in the face of these issues (IT Power, 2013).

The calculation of a higher tariff to create a sustainable financial model would require political agreement from the three Taupulega, but the nature of insular politics on Tokelau as a small cohesive community-led to political inaction from politicians looking to be reelected. The Government of Tokelau heavily subsidized electricity prices. There was also an issue of unpaid consumer power bills, where enforcement becomes difficult in a small cohesive community. In 2008 the unpaid power bill was estimated to be over $20,000 per atoll. This represents a uniquely Tokelauan problem, whereby everybody knows everybody and so doing what is deemed necessary becomes politically impossible (Huntsman & Kalolo, 2007). Issues such as this might have been paralyzing for the economies of other communities, but Tokelau innovated to continue its electricity supply despite its serious sustainability issues. The Government of Tokelau hopes that with the arrival of more extensive electricity provision, innovative policy will be able to solve these issues to bolster the benefits of TREP.

The movement to install TREP was driven by the Faipule of Fakaofo and one-time Ulu o Tokelau, Aliki Foua Toloa, who recognized the potentially global symbolism of the project in additional to the local economic and environmental gains and potential to provide a global platform for the issues his

nation faced. At the inauguration of the TREP project he acknowledged in his speech that Tokelau is, "too small to make any significant contribution to total world reduction in terms of GHG emission per person, but little by little if everyone contributes to the gradual reduction of GHG what a world it would be" (Weissbach, 2015). This humble contribution to greenhouse gas mitigation is also an innovative method of adaptation for Tokelau to improve the resilience of island communities against climate change. This innovation came from a need to showcase the islands on a global platform, as their extreme isolation and small size meant there was little media interest in *local* politics, despite the fact that external interest, particularly through financing, was essential for the project. Isolation also created the economic situation of extreme energy prices driving a project that would not be financially sustainable elsewhere in the world, working to drive innovation to shape a project that would meet the islands' needs.

4.3 New Zealand's involvement

Tokelau was able to realize the local project by engaging with New Zealand to solicit finance, as it was unlikely that it would have found the upfront costs to pay for the project. This is not least because many international institutions involved in global climate financing projects are bound to only give to projects in independent SIDS, and this definition often excludes Tokelau as a SNIJ of New Zealand. Additionally, Tokelau is limited by political factors in its ability to cofinance with most multilateral and bilateral donors. As part of New Zealand, with limited scope to engage in bilateral relations, Tokelau does not have the funding options and expertise available from donor nations that have financed renewable projects in many other Pacific island countries and territories (PICTs). Although Niue and the Cook Islands are eligible to access the Green Climate Fund, a pool of money donated by wealthy countries for climate change adaptation in developing countries, Tokelau is ineligible due to its constitutional relationship with New Zealand. This creates an interesting paradox since if the

independence referendum had passed, Tokelau would have found itself eligible for many different funding sources. As a territory of New Zealand, Tokelau was able to use its special relationship to solicit funding unavailable to independent SIDS. It also benefitted from funding from UNDP who are more flexible than some other institutions in their ability to donate. However, its existing relationship with New Zealand made it the ideal location and it is possible a project on this scale would not have been possible without direct aid from New Zealand.

Since Tokelau could provide the model for large remote independent grid systems in PICTs, New Zealand and other countries have started funding similar projects around the Pacific including the Cook Islands and Tuvalu. This is a way for New Zealand to expand its influence in the region and increase its green branding. Petroleum dependence is a problem across the Pacific Islands with many countries spending up to a third of their GDP on fossil fuels imports, exposing them to the volatility of the global oil market (Dornan & Spratt, 2014). As a result, many PICTs have expressed their interest in renewable resources and New Zealand has stepped in to help the capacity to fulfill these. This has particularly been in the Polynesian region, which has historically had closer ties to New Zealand. New Zealand also has considerable renewable energy expertise, generating 75% of electricity from hydro, geothermal and wind resources (Dornan & Spratt, 2014). Tokelau's energy goals from NEPSAP were in line with the green aspirations of the New Zealand Government (Empower Consultants, 2008). As the projects are usually monitored from a remote location to ensure smooth operation, New Zealand has also promoted discussion of sending all PICTs renewable data to a specialized center to process and reduce costs, and pool knowledge of operating remote grids such as these. Local training has been important to solve routine issues, but for advanced projects outside expertise continues to be necessary and periodic visits from engineers will be needed.

Navigating the complex relationship between country and territory became a source of tension between Tokelauan leaders and their New Zealand counterparts. The project fitted in with the green image of New Zealand and so on a global platform New Zealand was sometimes quick to credit itself for carrying out the project, and perhaps neglected to credit Tokelau with driving it themselves. Both nations wanted to claim ownership as a source of pride in the international climate change agenda, and a policy innovation that would frame them as a global leader. For example, in a 2004 report, Wade described initial investigations as primarily motivated by the GoT, stating that the GoT requested the survey as they and the three taupulega recognized the "risk associated with being so strongly dependent on imported petroleum" (p8). Meanwhile the installation company, PowerSmart, credited the Tokelauan people with the impetus for the project (TEDx Talks, 2013).

This ownership would enable New Zealand to become more respected on its climate change policy and help to retain its green image. For New Zealand, this was important as its government had been accused of neglecting to do enough to fight climate change, much to the consternation of its Pacific neighbors. It was surpassed by Australia, which was additionally blamed for actively sabotaging climate agreements by other Pacific island countries (Radio NZ, 2016). TREP allowed New Zealand to recoup its reputation on climate change and improve its relationship with other Pacific countries, by providing a location for a project that could take place with economic motivations but also positive environmental impacts. Tokelau utilized its SNIJ status to its advantage as a dimension to the innovation and planning of TREP, maximizing the benefits of a political situation that could be considered both within and outside of New Zealand.

New Zealand aided TREP but from an economic point of view rather than to fight climate change and raise global awareness. New Zealand's public recognition of motivation for the project mostly

revolved around economic issues in Tokelau and Empower Consultants (2008) acknowledge in their report that the unsustainability of expensive fossil fuel imports was a primary motivator for New Zealand (Empower Consultants, 2008). Foua Toloa did credit New Zealand and UNDP when dedicating the project, and other partners such as PowerSmart and IRENA. He said, "the world has learned and looked onto Tokelau as it takes an unprecedented step to become 100% renewable" (Toloa, 2012).

4.4 International environmental politics

The publicity and image derived from the project allowed Tokelau to overcome its lack of autonomy and remote location to achieve some influence on UN climate negotiations. Tokelau is acutely aware of its smallness and marginal position in global negotiations, compounded by its territorial status with New Zealand. "We stand to lose the most of any country in the world due to climate change and the rising sea levels," Toloa stated at the Durban Climate Conference, "so leading the way by making the highest per person investment in the world is a message to the world to do something." In dedication of TREP, Faipule Aliki Foua Toloa spoke of ridicule he received at Durban COP17 2011 on announcing the project as then Ulu o Tokelau, where it was said Tokelau's were too insignificant for an investment of this size to be worthwhile:

> *"We are here to convey the message that nowhere in all of these meetings, has Tokelau been able to have a voice in the policy development for adaptation and mitigation for climate change. We are part of that group of vulnerable nations most affected by climate change and yet do not have a presence within the formal discussions at the COP sessions and in the case of Tokelau, we are ineligible for Global Environment Facility funding" (Toloa, 2012).*

Despite attending UNFCCC COP17 as part of New Zealand's delegation, Tokelau came across as an independent country with a platform to announce the project with little mention of New Zealand's role, and challenged the rest of the world to follow its renewable path. It also raised the issue of its vulnerability as a coral atoll and so positioned TREP with the threat of climate change in mind. Tokelau has not had a big presence at climate summits since Durban, sometimes sending a single delegate as part of the New Zealand delegation. However, at the 2014 UN SIDS conference in Apia, Tokelau's leader represented the whole of New Zealand. The interaction of Tokelau with New Zealand at these arenas shows its limited autonomy, but also shows the flexibility given to its government by its status as a SNIJ.

4.5 TREP as island innovation

At the time of construction, the project was claimed to be the largest off grid system of its kind in the world. It was made of three distinct grids on each island. Many argued that high penetration of renewable energy was not practical for larger grids and would cause problems in the energy grid, but Tokelau was an instrumental force in showing the world that it could be done. The project was a form of policy innovation, using existing technology in a new way that demonstrated leadership across the Pacific region.

The important roles of the New Zealand and Tokelauan Government have led to interesting questions about their motivations and respective involvements with the project. Tokelau's current constitutional status means that it is inextricably linked to New Zealand for good and for worse, and even the GoT website uses a New Zealand domain name. Each party had similar but distinct motivations for entering into TREP. For Tokelau it was not only to reduce their expenses and improve island quality of life but to build global recognition of the threat faced by climate change. Although Tokelau's contribution

to greenhouse gases is globally insignificant, the islands wanted to provide moral leadership and encourage action from emitters. By branding itself as the world's first solar nation, Tokelau set an example to the world and gained moral high ground to argue for action on climate change. Again it benefited from its SNIJ status by identifying as a separate identity outside of New Zealand to maximize coverage of the project, while also using New Zealand funding and knowledge to help develop it.

Tokelau's branding of itself as a world leader in solar energy has been one of the few events that have given the islands worldwide recognition. A documentary titled "The Solar Nation of Tokelau" styles the islands' story with solar as a David and Goliath tale in which the atolls are portrayed as weak and vulnerable and overcoming the challenge of becoming the world's first 100% solar-powered nation and proving to the world that the unachievable ideal was truly possible. This even led to the development of an online game called Coconut Sunshine, where the player had to maximize the profits and use of solar panels on a small tropical island.

The coverage of the project also led to some inaccuracies due to journalistic embellishment. The island was framed as the 'world's biggest off grid solar system', although actually divided between the islands so it was actually three systems. The claim of 100% renewable energy generation is also arguable, as the islands still rely on diesel generation backup during cloudy periods. Although the initial idea was to provide this from coconut biofuel, it remains on fossil fuels due to technical complications of refining coconut oil. This framing for the press shows that media branding plays as important a role in innovation for climate change politics as the implementation of the technology itself. The inaccessibility of Tokelau allowed for the government to brand the project in its own way and, to some extent, dictate how the project would be covered by world media.

Chapter 5: Conclusion

"This was their dream, that they had built, and we had merely brought it to them."

-Dean Parchomchuk of PowerSmart on TREP (TEDx Talks, 2013)

This thesis explores how small island developing states (SIDS) have exerted agency through a changing global discourse on climate change, and argues that islands have used innovative practices to bring global attention and action to the environmental issues they face. The research links global environmental politics and island entrepreneurship and explores the interplay between these two central themes. The case study of the Tokelau Renewable Energy Project (TREP) is used to examine how island innovations around the development of a single project can have both local and international impacts that are formulated around climate change. This allows for broad insights on the intersection between innovation and environmental politics relevant to all SIDS, while noting the peculiarities that take shape in the Tokelauan context specifically. Every island group is different, and the Tokelau project has many factors unique to the geography, economics, and culture of the islands that resulted in this project being the first of its kind in the world.

The research acknowledges there is no single definition of SIDS, and so uses a broad definition of SIDS to encompass sub-national island jurisdictions (SNIJs) of non-SIDS countries. The Tokelau story reveals specifically that as a SNIJ of New Zealand, it lacks the politically independent voice at the UN afforded to its neighbors such as Tuvalu, and is both hindered and empowered by its constitutional relationship with New Zealand. This concluding chapter analyzes the level to which the

original research goals were met regarding TREP and its wider applicability to global climate change politics, and provides suggestions for future research in the field.

5.1 Methodology

This thesis is a broad analysis of the role of the way SIDS and SNIJs have come to form an integral part of global discussions on climate change. It examines how the context of climate change has created space for these nations to explore and innovate new strategies to exert agency and find their place in the global environmental political-economic system through indigenously-driven innovative practices. This research also aims to understand the role of innovation in the Tokelau Renewable Energy Project, and thus the role of Tokelau's sovereignty and colonial relationship with New Zealand. It tackles these questions with the following approaches:

- documenting how Tokelau emerged at the forefront of renewable energy action in the Pacific region and the agency this developed.
- documenting the local, national and international socio-economic processes that influenced the development of TREP.
- examining the impact that renewable projects such as TREP can have on discourse domestically and internationally.
- identifying the advantages and disadvantages that insularity poses to developing renewable energy projects such as TREP.

These methods have some limitations due to the practical aspects of accessing the islands in their extremely remote locations. Although it was possible to talk to government officials based out of Samoa, those conversations occurred on an informal basis and could have benefitted from more structured interviews. Though thesis explores the local and global processes that impact

environmental politics and island innovation at large, these conclusions are unique to the islands of Tokelau and not always applicable to other SNIJs and SIDS.

5.2 Islands as engines of innovation

Islands are defined by geographic and social boundaries that separate them from their neighbors. They are often defined according to an associated mainland, an entity which itself could be an island off another mainland ad infinitum (Baldacchino, 2008). Islands can also exist in archipelagic hierarchies, each island having a unique relationship with the other. They can be mere fragments of local municipalities, provinces and regions, or entire countries. Islands are also not always the marginal entity, sometimes hosting capital cities and existing at the center of vast empires.

This diversity does not mean islands lack commonalities. Isolation, fragmentation and small populations are all common features of insularity that can have a profound impact on cultural, society and the local political economy. Diseconomies of scale and high transaction costs due to transportation particularly affect the ability of many islands to interact with the wider capitalist system and engage in free trade. SIDS are a subcategory of islands that in particular exist on the margins of the neoliberal capitalist system and are thus forced to find ways to adapt and innovate in order to participate.

These conditions create situations that drive innovation and entrepreneurship, as islanders look to how they can use their scarce resources and adapt to meet unique local conditions. For SNIJs, the greater the degree of island autonomy the greater the effective use of this mechanism for islanders to create new revenue streams. By differentiating themselves from associated mainlands or neighboring

jurisdictions, islands can find ways to compete despite their inherent lack of economic competitiveness.

Policy innovation is one of the most heavily utilized forms of entrepreneurship by SNIJ governments. Through SNIJ status, islands can maximize their connections with their national government, while also taking advantage of their isolation and political autonomy. Through strategic navigation of these relationships, some SNIJs are able to position themselves ahead of geographically similar but independent polities, and exert political capital through this innovation. This is the case for Tokelau, where the government used its constitutional relationship with New Zealand to develop a project that had profound local benefits, while also sending a strong global political message that is rare for a SNIJ of that size.

Responding to the threat of climate change has enabled islands to carve out a niche and gain a global platform to voice their concerns. Islands' extreme vulnerability showcase the threats of climate change and they have been used to show the potential threats that many other regions could face in the future. Given islands marginal status in the field of global politics, it has taken significant skill and entrepreneurship by politicians and grassroots campaigners to become leaders, and have their voices heard over the larger and more powerful countries.

As leaders in knowledge production on climate change adaptation and mitigation, SIDS have found new sources of investment and foreign aid to help lead sustainable development projects. The constraints of insularity have become an advantage in this field, enabling SIDS to position themselves in a unique way to attract funding. This paradox for atoll countries such as Tokelau, however, is that increase in their recognition is due to the possibility of future disappearance from rising sea levels.

5.3 Tokelau as a jurisdictional case study

As an isolated and depopulated territory, Tokelau would not be expected to be a global leader in knowledge production and technological innovation for addressing climate change. The prevailing wisdom is that SIDS are non-competitive in entrepreneurship, yet the tiny nation became a global leader by generating almost all of its electricity with solar photovoltaic panels. Many unique aspects of Tokelau contribute to its leadership, including cultural norms, extremeness of its isolation, and its constitutional relationship with New Zealand. These distinctive factors mean that any conclusions drawn from Tokelau are difficult to apply to other jurisdictions where other variations to these conditions might exist.

However, in many ways Tokelau exemplifies the features of insularity. It is extremely fragmented, with little transport between atolls and a government based in another country. It has a tiny population, and is one of the remotest inhabited groups of islands in the world. It also has a population that has consistently voted to retain its colonial relationship as a SNIJ, rather than pursue independence or free association. Moreover, as an atoll, it is extremely sensitive to changes in global climate. Consequently, Tokelau could be the perfect SNIJ for analysis as it is so far removed from its mainland economically, culturally and politically. Yet Tokelau is also inimitable in every respect, and so perhaps it is unsurprising that it led the world to excel in its own distinctively Tokelauan way. For TREP this was shown by the thoughtful and methodical implementation of the project, and its uniform execution nationwide to ensure all three atolls benefited equally from the installations.

5.4 Contribution and further research

This thesis aims to contribute to the literature on SNIJs and climate change politics in the South Pacific and beyond. Although there is much writing on the role of SIDS in global environmental politics, and

the force of moral leadership in their arguments, little has been said about the role of SNIJs such as Tokelau. These polities are affected differently to that of sovereign states, although many of their features do appear similar to SIDS. SNIJs gain both advantages and disadvantages from their associations with larger states, and this impacts their ability to interact in climate summits with global decision making on fossil fuel emissions.

Further studies are needed to observe other examples of innovation in climate change adaptation and mitigation in both SIDS and SNIJs. For example, Kiribati was lauded on its purchase of land in Fiji for the relocation of its population in case of sea level rise, but this has not received much acclaim or attention from the academic community. Similarly, despite Tokelau's leadership in the field, there has also been little coverage of the nation's activities as compared to the other atoll nations, which are featured extensively. By linking island innovation to global climate politics, this thesis concludes that the interplay between the two is vital for securing the role of SIDS in the global economic-political order.

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Appendix A

This is intended to be an incomplete list of polities that could be considered under the umbrella term of SIDS, alongside some of the SNIJs that could also be considered SIDS.

Caribbean	**Pacific**	**AIMS**[1]
SIDS represented independently at United Nations		
Antigua and Barbuda	Federated States of Micronesia	Bahrain[5]
Bahamas	Fiji	Cape Verde
Barbados	Kiribati	Comoros
Belize[2]	Madagascar[4]	Cyprus[5]
Cuba[3]	Marshall Islands	Guinea-Bissau[2]
Dominica	Nauru	Maldives
Dominican Republic[3]	Palau	Malta[5]
Grenada	Papua New Guinea	Mauritius
Guyana[2]	Samoa	São Tomé and Príncipe
Haiti[3]	Solomon Islands	Seychelles
Jamaica	Timor-Leste	Singapore[6]
Saint Kitts and Nevis	Tonga	
Saint Lucia	Tuvalu	
Saint Vincent and the Grenadines	Vanuatu	
Suriname[2]		
Trinidad and Tobago		
SIDS not represented independently at United Nations[7]		
Anguilla	American Samoa	Ascension[9]
Aruba	Cook Islands[8]	Falkland Islands[9]
Bermuda	Easter Island	Gibraltar[9]
Bonaire	French Polynesia	Mayotte
British Virgin Islands	Guam	Réunion
Cayman Islands	New Caledonia	Saint Helena[9]
Curaçao	Niue[8]	Saint Pierre and Miquelon[9]
French Guiana[2]	Northern Mariana Islands	Tristan da Cunha[9]
Guadeloupe	Pitcairn Islands	
Martinique	Tokelau	
Montserrat	Wallis and Futuna	
Puerto Rico		
Saba		
Saint-Barthélemy		
Saint Martin		
Sint Eustatius		
Sint Maartin		
Turks and Caicos Islands		
United States Virgin Islands		

[1] African, Indian Ocean, Mediterranean and South China Sea. An older acronym that is rarely relevant for modern definitions. This column also includes non-Caribbean Atlantic states for the purposes of this appendix.

[2] Non-island polities with strong geographic, cultural or historical ties to islands meaning that they are sometimes considered as SIDS.

[3] Cuba, Dominican Republic and Haiti have large populations over 10 million and sometimes not included as SIDS, although all are members of AOSIS.

[4] Madagascar has a population of 23 million and rarely included as a SIDS, but is a member of the Indian Ocean Commission.

[5] Bahrain, Cyprus and Malta were formerly considered SIDS but usually not included in contemporary definitions.

[6] Singapore, a member of AOSIS, has one of the world's highest GDPs per capita.

[7] The list of SNIJs is less comprehensive as the number could increase exponentially according to the definition used. This list intends to be broad and used those SNIJs with the greatest level of autonomy, usually existing far away from their 'mainland'.

[8] Niue and the Cook Islands are sovereign nations in free association with New Zealand but without full UN members.

[9] Overseas territories of France and United Kingdom included for completeness. These are not considered SIDS but with some similar characteristics to other SIDS.